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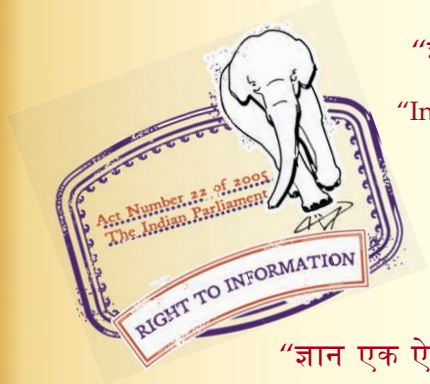
IS 6119 (1971): Carbon Arc Lamps for Motion Picture Projection [MED 32: Photographic Equipment]



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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS : 6119 - 1971
(Reaffirmed 2005)

Indian Standard

SPECIFICATION FOR CARBON ARC LAMPS FOR MOTION PICTURE PROJECTION

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NEW DELHI 1

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SPECIFICATION FOR CARBON ARC LAMPS FOR MOTION PICTURE PROJECTION

Cinematographic Equipment Sectional Committee, ETDC 47

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Indian Standard

SPECIFICATION FOR CARBON ARC LAMPS FOR MOTION PICTURE PROJECTION

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 May 1971, after the draft finalized by the Cinematographic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 Carbon arc lamps for motion picture projection are generally classified as low-intensity, simplified high-intensity and high-intensity arc lamps. The simplified high-intensity arc lamps are in large use now-a-days and this standard has been prepared with a view to covering such type of arc lamps.

0.3 Work on the formulation of standards for various cinematographic equipment has been undertaken with a view to establishing acceptable levels of quality and performance as well as bringing about a degree of interchangeability in these units. This is one of the series of Indian Standards on cinematographic equipment.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the general construction and performance requirements of mirror type simplified high-intensity arc lamps designed to provide substantially uniform beam of light for projection of cinematograph films.

1.2 It does not cover condenser type arc lamps or arc lamps with rotating positive carbons.

2. TERMINOLOGY

2.0 For the purpose of this standard the following definitions shall apply.

2.1 Arc Lamp — The housing and the associated mechanisms for burning arc lamp carbons with a view to producing substantially uniform beam of light for projection purposes.

*Rules for rounding off numerical values (*revised*).

2.2 Beam Divergence (in a Specified Plane) — The total angle in a specified plane containing the beam axis, between directions in which the intensity is 10 percent of the maximum intensity in that plane. If the plane is not specified, it shall be assumed to be horizontal.

3. DESIGN AND CONSTRUCTION

3.1 The lamp housing shall be a light alloy casting or be made of sheet steel, and shall be free from sharp corners. It shall be so designed to permit full access to the interior for servicing and maintenance.

3.2 The ventilation of the arc lamp shall be either natural or forced and be such that, during the course of its normal operation, the maximum temperature reached within the arc lamp shall not result in damage to any component without affecting the stability of the arc.

3.2.1 The housing shall also not permit appreciable stray light escape.

3.3 A suitable outlet not less than 100 mm diameter shall be provided over the normal burning position of the arc to allow the escape of gases during combustion and it shall also incorporate an adjustable damper to control the draft.

3.4 The provision for viewing the arc in operation from the operating side or preferably from both sides shall be made with a suitable heat-resisting coloured glass.

3.5 Flame Shield and Light Dowser — For protecting the mirror at the time of striking the arc, flame shield shall be provided and should be capable of being operated from preferably either side of the lamp house. A light dowser interlinked with flame shield shall also be provided to cut off the light from the arc lamp when not required. The flame shield shall protect the mirror from the striking flame jet at the time of striking of the arc when the dowser is closed.

4. FEED MECHANISM

4.1 An automatic carbon feed mechanism shall be provided and shall be so designed such that the rate of feed shall be adjustable by varying the speed of the motor. The motor shall be a dc shunt motor conforming to IS : 996-1964* operated within the range of voltage specified for the carbon trims used.

4.2 The rate of carbon feed shall be variable over a range of 140 to 390 mm for the positive and 60 to 140 mm/h for the negative.

NOTE — It is preferable to make provision for varying the feed ratio of positive and negative carbons to accommodate the different burning rate ratios throughout the current range of the carbon trim, in order to maintain the positive crater at its correct focus.

4.3 The feeding mechanism shall also be capable of being operated manually for both positive and negative carbons individually.

*Specification for single-phase small ac and universal electric motors (*revised*).

5. CARBON JAWS, GUIDES AND REST

5.1 The positive carbon jaws shall be made of heat-resisting material and shall be capable of gripping the carbons firmly and accurately to provide a good electrical contact. The positive carbon jaws shall be fully floating and so designed to take the range of carbon specified (7-, 8- and 9-mm carbons for 35-mm films and 5- and 6-mm for 16-mm films). The negative carbon jaws shall be built as a complete assembly and shall be capable of being removed as a composite unit for servicing and adjustment. It shall also be fully floating to allow for inaccuracies in the carbon. The complete jaw shall be capable of being moved toward the rear of the arc lamp so that the negative carbon may be trimmed behind the reflector appropriately for convenience in loading of the carbon.

5.2 The negative carbon rest shall be made of heat-resisting metal capable of withstanding the high temperatures close to the arc. The guides shall be so designed that they are capable of replacement and adjustment without using special tools.

5.3 Positive Carbon Rest — The positive carbon shall be capable of being supported by a suitable rest which shall be as near as practicable to the crater position and shall be adjustable vertically during set-up.

5.4 The feed mechanism shall be protected with a detachable cover to present ash deposition in use.

6. CONTROL OF THE POSITION OF TAIL FLAME

6.1 A suitable permanent magnet or electromagnet shall be provided to control the position of the tail flame.

NOTE — The magnetic field shall be so oriented that the tail flame is directed upward and away from the mirror.

7. REFLECTORS

7.1 An elliptical reflector of suitable size shall be fitted behind the arc. The reflector shall be capable of being aligned to the optical axis of the aperture. The angle subtended by the reflector at the light source shall be adequate to ensure total coverage of the gate in the position of maximum beam divergence.

7.2 The reflector holder shall be of sturdy construction to prevent warpage in normal use. The reflector shall be resiliently mounted in such a way as to absorb the normal vibration shocks that may be encountered during the operation and to accommodate expansion and contractions occurring during the heat cycles. The design of the reflector holder shall be such that the reflector is capable of easy installation and maintenance.

7.3 Provision shall be made for tilting the reflector on its horizontal and vertical axes for centering the spot on the gate. The control knobs for making

these adjustments shall be easily accessible. In addition, provision may be incorporated for adjusting the reflector longitudinally for focusing the carbon crater.

7.4 Provision shall be made for a small reflecting mirror and an appropriate scale to show the correct position of arc gap.

8. ELECTRICAL WIRING

8.1 The electrical wiring shall generally comply with the local Rules and Regulations made under the relevant Cinematograph Act.

a) Any flexible cable fitted external to the lamp house shall be of appropriate size for the current rating and shall comply with the relevant Indian Standards.
b) A suitable strain relief shall be provided to prevent mechanical strain on an external flexible cord from being transmitted to terminals, splices or internal wiring.
c) An external flexible cord shall be prevented from being pushed inside the enclosure in which it terminates, if there is any liability of damage to interior wiring from such action.
d) All cables into the lamp house shall be bushed or otherwise arranged to prevent abrasion of cable.
e) The cable within the lamp house shall have a suitable heat-resisting insulation.

NOTE — It is recommended that the insulation be non-hygroscopic.

8.2 Metering — A suitable ammeter complying with IS : 1248-1968* to indicate the current consumption of the arc shall be provided. A voltmeter may also be provided if required by the purchaser.

8.3 Switch or Terminal Block — When a switch is specified by the purchaser, the fitting shall be provided with a double-pole switch of adequate capacity.

If no switch is fitted, a terminal block of adequate capacity shall be fitted. All terminals for the reception of the cable, whether on the switch or on the terminal block, shall be shrouded suitably lettered for identification.

9. MARKING

9.1 The following information shall be clearly and indelibly marked:

a) Name or trade-mark, or both, of the manufacturer or supplier;
b) Type and serial number;
c) Rated voltage and rated current of the arc lamp; and
d) Country of manufacture.

9.1.1 The arc lamps may also be marked with the ISI Certification Mark.

*Specification for direct acting electrical indicating instruments (*first revision*).

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

10. TESTS

10.1 Classification of Tests

10.1.1 *Type Tests* — The following shall constitute type tests:

a) Visual examination (*see* **10.2**),
b) Insulation resistance test (*see* **10.3**),
c) High voltage test (*see* **10.4**),
d) Mechanical strength test (*see* **10.5**), and
e) Heating test (*see* **10.6**).

10.1.2 *Routine Tests* — The following shall be carried out as routine tests:

a) Visual examination (*see* **10.2**),
b) Insulation resistance test (*see* **10.3**), and
c) High voltage test (*see* **10.4**).

10.2 Visual Examination — The arc lamps shall be examined for external finish workmanship and electrical connections.

10.3 Insulation Resistance Test

10.3.0 This test may be carried out in the prevailing atmospheric temperature and humidity.

10.3.1 The insulation resistance shall be measured by the application of a dc voltage of 500 V for one minute between line parts:

a) of different polarity inside the arc lamp, and
b) external metal parts of the arc lamp by the application of a dc voltage of 500 V for one minute.

10.4 High Voltage Test

10.4.1 All arc lamps shall satisfactorily withstand the application of 1 000 V rms between the parts specified in **10.3.1**.

10.4.2 The test voltage shall be approximately of sine-wave form having any convenient frequency between 40 and 60 hertz.

10.4.3 The full test voltage shall be applied gradually. The initial voltage shall not exceed 30 percent of the full test voltage and shall be increased

uniformly to the full voltage within 30 seconds. The full test voltage shall be maintained for one minute after which the test voltage shall be diminished rapidly to 30 percent of its full value before switching it off.

10.4.4 There shall be no puncture or arcing during the high voltage test.

10.4.5 For routine test, the high voltage test may be carried out in the form of a flash test by the application of 1 500 V rms for a duration of approximately 5 seconds between the parts specified in **10.3.1**.

10.5 Mechanical Strength Test — Arc lamps shall withstand all the mechanical stress to which they may be subjected when installed in normal use and during maintenance. Compliance is checked in the following manner:

a) Blows are applied to the sample by means of a spring-operated impact test apparatus shown in Fig. 1.

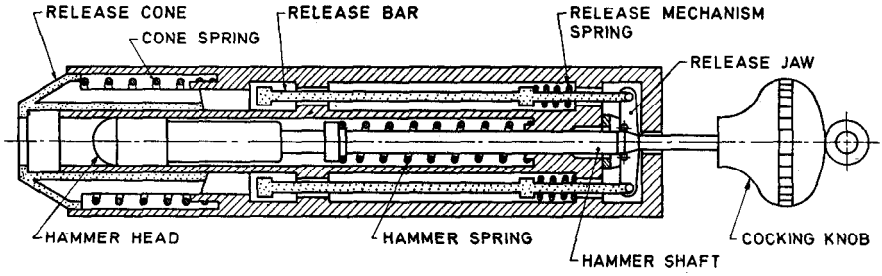

FIG. 1 IMPACT TEST APPARATUS

b) The apparatus consists of three main parts, the body, the striking element and the spring-loaded release cone.

c) The body comprises the housing, the striking element guide, the release mechanism and all parts rigidly fixed thereto. The mass of this assembly is 1 250 g. The striking element comprises the hammer head, the hammer shaft and the cocking knob. The mass of this assembly is 250 g. The hammer head has a hemispherical face of polyamide having a Rockwell hardness of 100 *HR*, with a radius of 10 mm; it is fixed to the hammer shaft in such a way that the distance from its tip to the plane of the front of the cone, when the striking element is on the point of release, is equal to 17 mm.

d) The cone has a mass of 60 g and the cone spring is such that it exerts a force of 20 N when the release jaws are on the point of releasing the striking element.

e) The hammer spring is such that the product of the compression, in millimetres, and the force exerted, in newtons, equals 1 000, the compression being approximately 20 mm. The spring is adjusted so as to cause the hammer to strike with an impact energy of 0·35 Nm, the spring compression being 17 mm.

f) The release mechanism springs are adjusted so that they exert just sufficient pressure to keep the release jaws in the engaged position.

g) The apparatus is cocked by pulling the cocking knob back until the release jaws engage with the groove in the hammer shaft.

h) The blows are applied by pushing the release cone against the sample in a direction perpendicular to the surface at the point to be tested.

j) The pressure is slowly increased so that the cone moves back until it is in contact with the release bars, which then move to operate the release mechanism and allow the hammer to strike.

k) The sample is rigidly supported, cable entirely being left open, knockouts opened, and cover-fixing and similar screws tightened.

m) Three blows are applied to every point that is likely to be weak, paying special regard to insulating material enclosing live parts and to bushings of insulating material, if any.

n) After the test, the sample shall show no damage within the meaning of this specification, in particular:

1) live parts shall not have become accessible,

2) enclosures and bushings shall show no cracks visible to the naked eye,

3) the effectiveness of insulating linings and barriers shall not have been impaired, and

4) it shall be possible to remove and to replace external covers without breaking these covers or their insulating linings.

p) Breakage of an enclosure is, however, allowed if it is backed by an inner cover which will withstand the test after removal of the enclosure.

10.6 Heating Test — When the arc lamp is operated in free air with the specified arc carbons of the highest rating, the maximum temperature reached after continuous operation for an hour, shall not result in damage to the arc lamp or to any of its components.